General

Guideline Title

ACR Appropriateness Criteria® imaging of deep inferior epigastric arteries for surgical planning (breast reconstruction surgery).

Bibliographic Source(s)

Olivia IB, Day K, Dill KE, Hanley M, Ahmed O, Bennett SJ, Desjardins B, Gage KL, Ginsburg M, Hamawy AH, Steigner ML, Strax R, Verma N, Rybicki FJ, Expert Panel on Vascular Imaging. ACR Appropriateness CriteriaÂ® imaging of deep inferior epigastric arteries for surgical planning (breast reconstruction surgery). Reston (VA): American College of Radiology (ACR); 2017. 8 p. [39 references]

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

NEATS Assessment

National Guideline Clearinghouse (NGC) has assessed this guideline's adherence to standards of trustworthiness, derived from the Institute of Medicine's report Clinical Practice Guidelines We Can Trust.

▮▯▯▯▯= Poor ▮▮▯▯▯= Fair ▮▮▮▯▯= Good ▮▮▮▮▯= Very Good ▮▮▮▮▮= Excellent

Assessment	Standard of Trustworthiness
YES	Disclosure of Guideline Funding Source
▮▮▮▮▮	Disclosure and Management of Financial Conflict of Interests
	Guideline Development Group Composition
YES	Multidisciplinary Group

YES	Methodologist Involvement
■□□□□	Patient and Public Perspectives
	Use of a Systematic Review of Evidence
■■■■■	Search Strategy
■■■□□	Study Selection
■■■■□	Synthesis of Evidence
	Evidence Foundations for and Rating Strength of Recommendations
■■□□□	Grading the Quality or Strength of Evidence
■■■■■	Benefits and Harms of Recommendations
■■■■■	Evidence Summary Supporting Recommendations
■■■■□	Rating the Strength of Recommendations
■■■■■	**Specific and Unambiguous Articulation of Recommendations**
■□□□□	**External Review**
■■■□□	**Updating**

Recommendations

Major Recommendations

ACR Appropriateness Criteria®

Imaging of Deep Inferior Epigastric Arteries for Surgical Planning (Breast Reconstruction Surgery)

Variant 1: Imaging of deep inferior epigastric arteries for surgical planning (breast reconstruction surgery).

Procedure	Appropriateness Category	Relative Radiation Level
CTA abdomen and pelvis with IV contrast	Usually Appropriate	☢☢☢☢☢
MRA abdomen and pelvis without and with IV contrast	Usually Appropriate	O
MRA abdomen and pelvis without IV contrast	May Be Appropriate	O
Arteriography abdomen and pelvis	Usually Not Appropriate	☢☢☢☢
CT abdomen and pelvis with IV contrast	Usually Not Appropriate	☢☢☢☢
US color Doppler abdomen and pelvis	Usually Not Appropriate	O
CT abdomen and pelvis without and with IV contrast	Usually Not Appropriate	☢☢☢☢

Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen and pelvis without IV contrast	Usually Not Appropriate	☢☢☢☢
MRI abdomen and pelvis without and with IV contrast	Usually Not Appropriate	O
MRI abdomen and pelvis without IV contrast	Usually Not Appropriate	O

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Introduction/Background

The most common malignancy in women in the United States is breast cancer. Despite advances in treatment options, mastectomy followed by breast reconstruction remains a common therapeutic selection. There are various choices for breast reconstruction surgery ranging from saline or silicone implants to autologous tissue reconstruction. Autologous breast reconstruction is usually sought by patients and clinicians because it may provide a more aesthetic outcome than other breast reconstruction techniques. The breast can be reconstructed from a range of donor sites but the abdominal wall integument allows for versatility in flap volume and design.

Breast reconstruction using a flap from a lower abdominal donor site began with the development of the pedicled transverse rectus abdominis myocutaneous (TRAM) flap in 1982. It was soon discovered that morbidity could be decreased by reducing the amount of injury to the muscle at the donor site, which led to the development of muscle-sparing procedures, including segmental latissimus dorsi myocutaneous and free-TRAM flaps. To further minimize donor site morbidity, the rectus abdominis musculature was increasingly spared in muscle-sparing TRAM flaps. The preservation of the entire rectus muscle was realized with the deep inferior epigastric perforator (DIEP) flap.

The DIEP flap preserves the underlying muscle, reduces morbidity, and preserves functionality; however, it requires a more intensive surgery and microsurgical revascularization when compared to the TRAM flap procedures. The DIEP flap arterial supply is via intramuscular perforators from the deep inferior epigastric artery (DIEA), which arises from the external iliac artery. The anatomy of the DIEA itself is consistent, making this vessel easily identifiable without preoperative imaging and allowing this operation before the advent of preoperative imaging planning.

The perforator branches of the DIEA have a variable anatomy that may even exist between the right and left hemiabdomen in the same patient. These perforator branches have been traditionally classified as a single (type 1), bifurcating (type 2), and trifurcating trunk (type 3). The perforator arteries are then individually divided into intramuscular, subfascial, and subcutaneous segments. This unpredictable anatomy may lead to lengthy perforator vessel selection and therefore longer operative times when imaging is not used as part of the preoperative planning. Additionally, preoperative imaging planning that accurately maps the perforators and its branches leads to reduced operative time, reduced abdominal morbidity, and increased flap reliability.

The information most critical to the surgical team includes the location, size, and intramuscular course of the perforator branch. To best aid the surgical team, multiple perforators are identified, which are typically ranked based on size, location, and intramuscular course. The selection of the "best" perforator is the most difficult diagnostic challenge in preoperative imaging and during the surgery. The ideal perforator should have the largest caliber available given its influence on flap viability. The ideal perforator should also be medially located within the flap with an extended vascular territory beyond the midline to best provide optimal perfusion, preservation of muscle innervation, and avoid fat necrosis. Additionally, a short intramuscular course allows for successful dissection. Regardless of the imaging modality, perforators are reported with the location where it pierces the anterior rectus sheath in relation to the umbilicus. This is an important distinction because the position of the perforator within the subcutaneous tissues can move with applied pressure; however, the rectus sheath is immobile relative to the umbilicus. This concept is applied in computed tomography angiography (CTA) and magnetic resonance angiography (MRA) with localization of perforators on maximum intensity projection (MIP) images at the anterior rectus sheath and then superimposing the location onto 3-D skin surface rendered images. Information about the perforator size and intramuscular course are also reported to help prioritize which perforators may be used for the procedure.

Preoperative Imaging

The goal of preoperative imaging is to aid the surgical team in preoperative planning given the variability of the DIEA perforator branches anatomy between patients, and even between the left and right hemiabdomen of the same patient. Improved clinical outcomes with preoperative imaging have been shown (predominantly with CTA) to include decreased length of surgery, decreased flap loss rate, decreased hernia rate, decreased intraoperative blood loss, shorter mean inpatient stay, reduced learning curve when compared with hand-held Doppler, and increased surgeon confidence.

Discussion of Procedures by Variant

Variant 1: Imaging of Deep Inferior Epigastric Arteries for Surgical Planning (Breast Reconstruction Surgery)

US

Color Doppler ultrasound (US) allows for evaluation of perforator location, size, and associated information on vessel integrity including atherosclerotic disease, a prior surgery (scar tissue), or other vascular disorders. There is a significant challenge in interpreting real-time sonographic images into a report that is beneficial to the surgical team. For this document, it is assumed the procedure is performed and interpreted by an expert. Color Doppler US remains a real-time imaging technique that cannot be fully used by the surgical team in the operating room. When compared to color Doppler US, CTA is a more intuitive modality that is favored by many surgeons and can also be used for reference in the operating room. Multiple studies have shown the superior accuracy of CTA over color Doppler US in preoperative perforator imaging.

Arteriography

Conventional angiography with and without the use of cone-beam CT theoretically would aid preoperative planning for DIEP flaps given its relatively high spatial resolution and ability to selectively catheterize the DIEP. However, given the invasive nature of the procedure without therapeutic benefit and ionic contrast exposure, it is not routinely used in these patients. Prior to the development of noninvasive imaging modalities, DIEP flaps were performed without preoperative imaging given the consistency of the DIEA.

CTA

CTA is the current diagnostic modality of choice for evaluation of perforators in preoperative DIEP flap planning. CT is a readily available and fast imaging test with a positive predictive value of 100% for perforators >1 mm. CTA is extremely reproducible. The diagnostic quality of CTA is dependent on optimal DIEA enhancement. Given the associated radiation, a single contrast-enhanced phase is obtained relying on a region of interest for automatic injection placed on the femoral artery. Additionally, reversed caudal-cranial scanning from the pubic symphysis towards the umbilicus improves DIEA enhancement.

Perforators are localized on MIP images along the anterior rectus sheath; the location is then superimposed on 3-D skin surface rendered images. Additionally, axial and sagittal MIP images are used to depict the perforator's course through the subcutaneous tissues, including the intramuscular portion within the rectus muscle. Perforators are typically ranked based on size, location, and intramuscular course. Additional information that can be obtained by CTA includes venous communication between the right and left abdomen, cutaneous perforators, as well as other parameters that can be used to calculate flap viability and flap weights, all of which can help preoperative planning by surgical teams. Recent research has shown that 3-D postprocessing of CTA data may also improve accuracy in identifying perforators. CTA has been accepted as the gold standard in preoperative planning for DIEP flaps with sensitivity of 96% for all perforators and sensitivity of 100% for perforators >1 mm.

Preoperative imaging with CTA demonstrates improved clinical outcomes including decreased length of surgery, decreased flap loss rate, decreased hernia rate, decreased intraoperative blood loss, shorter mean inpatient stay, reduced learning curve when compared with hand-held Doppler, and increased surgeon confidence. Additionally, meta-analyses of preoperative imaging in DIEP flaps demonstrate improved clinical outcomes with CTA over color Doppler US, including overall flap-related complications, donor-site morbidity, and decreased length of surgery.

For the purposes of distinguishing between CT and CTA, the ACR Appropriateness Criteria topics use the definition in the *Practice Parameter for the Performance and Interpretation of Body Computed Tomography Angiography (CTA)*: "CTA uses a thin-section CT acquisition that is timed to coincide with peak arterial or venous enhancement. The resultant volumetric dataset is interpreted using primary transverse reconstructions as well as multiplanar reformations and 3-D renderings." All procedure elements are essential: (1) timing, (2) recons/reformats, and (3) 3-D renderings. Standard CTs with contrast also include timing issues and recons/reformats. Only in CTA, however, is 3-D rendering a required element. This corresponds to the definitions that CMS has applied to the CPT codes.

CT

There is no relevant literature regarding the use of standard CT without and/or with contrast.

MRA

MRA use in evaluation for DIEP flaps was described relatively recently, in 2009. The benefits of MRA are the lack of radiation exposure and iodinated contrast, which allows for multiple phases to be acquired and aids in optimal contrast timing. Although MRA has lower spatial resolution than CTA, MRA has higher contrast resolution, allowing the detection of submillimeter gadolinium-enhanced structures such as the DIEA perforators. MRA analysis and postprocessing is similar to CTA, which uses perforators localized on MIP images along the anterior rectus sheath, after which the location is superimposed on 3-D skin surface rendered images. Additionally, axial and sagittal MIP images are used to depict the perforator's course. Of note, slight errors in measurement may be attributable to compression of the anterior abdominal wall by the applied MR torso coil. Limitations of MRA include longer scan times than CT, and MRI contraindications including patient claustrophobia, implanted metallic devices, and renal impairment.

Early studies have shown accurate localization of perforators with MRA for DIEP flaps. Application of novel MR techniques, such as the use of unenhanced MRA, has shown promise as the vessels can be visualized without intravenous administration of contrast. A few small studies comparing CTA and MRA have shown that CTA is more accurate than MRA and remains the preferred modality due to its higher spatial resolution and higher sensitivity in identifying the perforator branches. Larger studies are needed to evaluate the accuracy of the new emerging MRA techniques and their role in preoperative perforator branch imaging.

MRI

There is no significant literature supporting the use of standard MRI without and/or with contrast.

Summary of Recommendations

In preoperative planning prior to breast reconstruction using DIEP flap, CTA abdomen and pelvis with IV contrast is the first-line imaging modality. MRA abdomen and pelvis without and with IV contrast is a reasonable alternative.

Abbreviations

CT, computed tomography
CTA, computed tomographic angiography
IV, intravenous
MRA, magnetic resonance angiography
MRI, magnetic resonance imaging
US, ultrasound

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
O	0 mSv	0 mSv
☢	<0.1 mSv	<0.03 mSv
☢☢	0.1-1 mSv	0.03-0.3 mSv
☢☢☢	1-10 mSv	0.3-3 mSv
☢☢☢☢	10-30 mSv	3-10 mSv
☢☢☢☢☢	30-100 mSv	10-30 mSv
*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies."		

Clinical Algorithm(s)

Algorithms were not developed from criteria guidelines.

Scope

Disease/Condition(s)

Breast cancer

Guideline Category

Evaluation

Treatment

Clinical Specialty

Family Practice

Internal Medicine

Obstetrics and Gynecology

Oncology

Plastic Surgery

Radiology

Intended Users

Advanced Practice Nurses

Health Care Providers

Hospitals

Managed Care Organizations

Physician Assistants

Physicians

Students

Utilization Management

Guideline Objective(s)

To evaluate the appropriateness of imaging procedures for imaging of deep inferior epigastric arteries for surgical planning

Target Population

Women undergoing autologous breast reconstruction

Interventions and Practices Considered

- Computed tomography angiography (CTA), abdomen and pelvis with intravenous (IV) contrast
- Magnetic resonance angiography (MRA), abdomen and pelvis
  - Without and with IV contrast
  - Without IV contrast
- Arteriography, abdomen and pelvis
- Computed tomography (CT), abdomen and pelvis
  - With IV contrast
  - Without and with IV contrast
  - Without IV contrast
- Ultrasound (US) color Doppler, abdomen and pelvis
- Magnetic resonance imaging (MRI), abdomen and pelvis
  - Without and with IV contrast
  - Without IV contrast

Major Outcomes Considered

- Utility of imaging procedures in the imaging of deep inferior epigastric arteries for surgical planning
- Sensitivity, specificity, and accuracy of imaging procedures in imaging of deep inferior epigastric arteries for surgical planning

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Summary

A literature search was conducted in September 2015 and updated in June 2017 to identify evidence for the *ACR Appropriateness Criteria® Imaging of Deep Inferior Epigastric Arteries for Surgical Planning (Breast Reconstruction Surgery)* topic. Using the search strategy described in the literature search companion (see the "Availability of Companion Documents" field), 218 articles were found. Thirty-seven articles were used in the topic. Nine articles were not used as they were duplicates captured in more than one literature search. The remaining articles were not used due to either poor study design, the articles were not relevant or generalizable to the topic, or the results were unclear or biased.

Two citations are supporting documents that were added by staff.

See also the American College of Radiology (ACR) Appropriateness Criteria® literature search process document (see the "Availability of Companion Documents" field) for further information.

Number of Source Documents

The literature search conducted in September 2015 and updated in June 2017 found 37 articles that were used in the topic. Two citations are supporting documents that were added by staff.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Definitions of Study Quality Categories

Category 1 - The study is well-designed and accounts for common biases.

Category 2 - The study is moderately well-designed and accounts for most common biases.

Category 3 - The study has important study design limitations.

Category 4 - The study or source is not useful as primary evidence. The article may not be a clinical study, the study design is invalid, or conclusions are based on expert consensus.

> The study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description);
>
> *Or*
>
> The study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence;
>
> *Or*
>
> The study is an expert opinion or consensus document.

Category M - Meta-analysis studies are not rated for study quality using the study element method because the method is designed to evaluate individual studies only. An "M" for the study quality will indicate that the study quality has not been evaluated for the meta-analysis study.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The topic author assesses the literature then drafts or revises the narrative summarizing the evidence found in the literature. American College of Radiology (ACR) staff drafts an evidence table based on the analysis of the selected literature. These tables rate the study quality for each article included in the narrative.

The expert panel reviews the narrative, evidence table and the supporting literature for each of the topic-variant combinations and assigns an appropriateness rating for each procedure listed in the variant table(s). Each individual panel member assigns a rating based on his/her interpretation of the available evidence.

More information about the evidence table development process can be found in the ACR Appropriateness Criteria® Evidence Table Development document (see the "Availability of Companion Documents" field).

Methods Used to Formulate the Recommendations

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

<u>Overview</u>

The purpose of the rating rounds is to systematically and transparently determine the panels' recommendations while mitigating any undue influence of one or more panel members on another individual panel members' interpretation of the evidence. The panel member's rating is determined by reviewing the evidence presented in the Summary of Literature Review and assessing the risks or harms of performing the procedure or treatment balanced with the benefits of performing the procedure or treatment. The individual panel member ratings are used to calculate the median rating, which determines the panel's rating. The assessment of the amount of deviation of individual ratings from the panel rating determines whether there is disagreement among the panel about the rating.

The process used in the rating rounds is a modified Delphi method based on the methodology described in the RAND/UCLA Appropriateness Method User Manual.

The appropriateness is rated on an ordinal scale that uses integers from 1 to 9 grouped into three categories (see the "Rating Scheme for the Strength of the Recommendations" field).

<u>Determining the Panel's Recommendation</u>

- Ratings represent an individual's assessment of the risks and benefits of performing a specific procedure for a specific clinical scenario on an ordinal scale. The recommendation is the appropriateness category (i.e., "Usually appropriate", "May be appropriate", or "Usually not appropriate").
- The appropriateness category for a procedure and clinical scenario is determined by the panel's median rating without disagreement (see below for definition of disagreement). The panel's median rating is calculated after each rating round. If there is disagreement after the second rating round, the rating category is "May be appropriate (Disagreement)" with a rating of "5" so users understand the group disagreed on the final recommendation. The actual panel median rating is documented to provide additional context.
- Disagreement is defined as excessive dispersion of the individual ratings from the group (in this

case, an Appropriateness Criteria [AC] panel) median as determined by comparison of the interpercentile range (IPR) and the interpercentile range adjusted for symmetry (IPRAS). In those instances when the IPR is greater than the IPRAS, there is disagreement. For a complete discussion, please refer to chapter 8 of the RAND/UCLA Appropriateness Method User Manual.
Once the final recommendations have been determined, the panel reviews the document. If two thirds of the panel feel a final recommendation is wrong (e.g., does not accurately reflect the evidence, may negatively impact patient health, has unintended consequences that may harm health care, etc.) and the process must be started again from the beginning.

For additional information on the ratings process see the Rating Round Information document (see the "Availability of Companion Documents" field).

Additional methodology documents, including a more detailed explanation of the complete topic development process and all ACR AC topics can be found on the ACR Web site (see also the "Availability of Companion Documents" field).

Rating Scheme for the Strength of the Recommendations

Appropriateness Category Names and Definitions

Appropriateness Category Name	Appropriateness Rating	Appropriateness Category Definition
Usually Appropriate	7, 8, or 9	The imaging procedure or treatment is indicated in the specified clinical scenarios at a favorable risk-benefit ratio for patients.
May Be Appropriate	4, 5, or 6	The imaging procedure or treatment may be indicated in the specified clinical scenarios as an alternative to imaging procedures or treatments with a more favorable risk-benefit ratio, or the risk-benefit ratio for patients is equivocal.
May Be Appropriate (Disagreement)	5	The individual ratings are too dispersed from the panel median. The different label provides transparency regarding the panel's recommendation. "May be appropriate" is the rating category and a rating of 5 is assigned.
Usually Not Appropriate	1, 2, or 3	The imaging procedure or treatment is unlikely to be indicated in the specified clinical scenarios, or the risk-benefit ratio for patients is likely to be unfavorable.

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The recommendations are based on analysis of the current medical evidence literature and the application of the RAND/UCLA appropriateness method and expert panel consensus.

Summary of Evidence

Of the 39 references cited in the *ACR Appropriateness Criteria® Imaging of Deep Inferior Epigastric Arteries for Surgical Planning (Breast Reconstruction Surgery)* document, 2 are categorized as therapeutic references, including 1 well-designed study. Additionally, 35 references are categorized as diagnostic references including 9 good-quality studies and 12 quality studies that may have design limitations. There are 14 references that may not be useful as primary evidence. There are 2 references that are meta-analysis studies.

Although there are references that report on studies with design limitations, 10 well-designed or good-quality studies provide good evidence.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- The goal of preoperative imaging is to aid the surgical team in preoperative planning given the variability of the deep inferior epigastric artery (DIEA) perforator branches anatomy between patients, and even between the left and right hemiabdomen of the same patient. Improved clinical outcomes with preoperative imaging have been shown (predominantly with computed tomography angiography [CTA]) to include decreased length of surgery, decreased flap loss rate, decreased hernia rate, decreased intraoperative blood loss, shorter mean inpatient stay, reduced learning curve when compared with hand-held Doppler, and increased surgeon confidence.
- Preoperative imaging planning that accurately maps the perforators and its branches leads to reduced operative time, reduced abdominal morbidity, and increased flap reliability.
- Preoperative imaging with CTA demonstrates improved clinical outcomes including decreased length of surgery, decreased flap loss rate, decreased hernia rate, decreased intraoperative blood loss, shorter mean inpatient stay, reduced learning curve when compared with hand-held Doppler, and increased surgeon confidence. Additionally, meta-analyses of preoperative imaging in deep inferior epigastric perforator (DIEP) flaps demonstrate improved clinical outcomes with CTA over color Doppler ultrasound (US), including overall flap-related complications, donor-site morbidity, and decreased length of surgery.
- The benefits of magnetic resonance angiography (MRA) are the lack of radiation exposure and iodinated contrast, which allows for multiple phases to be acquired and aids in optimal contrast timing. Although MRA has lower spatial resolution than CTA, MRA has higher contrast resolution, allowing the detection of submillimeter gadolinium-enhanced structures such as the DIEA perforators.

Potential Harms

Relative Radiation Level Information

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure.

Patients in the pediatric age group are at inherently higher risk from exposure, both because of organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared to those specified for adults. Additional information regarding radiation dose assessment for imaging examinations can be found in the American College of Radiology (ACR) Appropriateness Criteria® Radiation Dose Assessment Introduction document (see the "Availability of Companion Documents" field).

Contraindications

Contraindications

Magnetic resonance imaging (MRI) contraindications include patient claustrophobia, implanted metallic devices, and renal impairment.

Qualifying Statements

Qualifying Statements

- The American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.
- ACR seeks and encourages collaboration with other organizations on the development of the ACR Appropriateness Criteria through society representation on expert panels. Participation by representatives from collaborating societies on the expert panel does not necessarily imply society endorsement of the final document.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Olivia IB, Day K, Dill KE, Hanley M, Ahmed O, Bennett SJ, Desjardins B, Gage KL, Ginsburg M, Hamawy AH, Steigner ML, Strax R, Verma N, Rybicki FJ, Expert Panel on Vascular Imaging. ACR Appropriateness CriteriaÂ® imaging of deep inferior epigastric arteries for surgical planning (breast reconstruction surgery). Reston (VA): American College of Radiology (ACR); 2017. 8 p. [39 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2017

Guideline Developer(s)

American College of Radiology - Medical Specialty Society

Source(s) of Funding

The funding for the process is assumed entirely by the American College of Radiology (ACR). ACR staff support the expert panels through the conduct of literature searches, acquisition of scientific articles, drafting of evidence tables, dissemination of materials for the Delphi process, collation of results, conference calls, document processing, and general assistance to the panelists.

Guideline Committee

Committee on Appropriateness Criteria, Expert Panel on Vascular Imaging

Composition of Group That Authored the Guideline

Panel Members: Isabel B. Oliva, MD (*Principal Author*); Kevin Day, MD (*Research Author*); Karin E. Dill (*Panel Chair*), MD; Michael Hanley, MD (*Panel Vice-chair*); Osmanuddin Ahmed, MD; Shelby J. Bennett, MD; Benoit Desjardins, MD, PhD; Kenneth L. Gage, MD, PhD; Michael Ginsburg, MD; Adam H. Hamawy, MD; Michael L. Steigner, MD; Richard Strax, MD; Nupur Verma, MD; Frank J. Rybicki, MD, PhD (*Specialty Chair*)

Financial Disclosures/Conflicts of Interest

Disclosing Potential Conflicts of Interest and Management of Conflicts of Interest

An important aspect of committee operations is the disclosure and management of potential conflicts of interest. In 2016, the American College of Radiology (ACR) began an organization-wide review of its conflict of interest (COI) policies. The current ACR COI policy is available on its Web site. The Appropriateness Criteria (AC) program's COI process varies from the organization's current policy to accommodate the requirements for qualified provider-led entities as designated by the Centers for Medicare and Medicaid Services' Appropriate Use Criteria (AUC) program.

When physicians become participants in the AC program, welcome letters are sent to inform them of their panel roles and responsibilities, including a link to complete the COI form. The COI form requires disclosure of all potential conflicts of interest. ACR staff oversees the COI evaluation process, coordinating with review panels consisting of ACR staff and members, who determine when there is a conflict of interest and what action, if any, is appropriate. In addition to making the information publicly available, management may include exclusion from some topic processes, exclusion from a topic, or exclusion from the panel.

Besides potential COI disclosure, AC staff begins every committee call with the conflict of interest disclosure statement listed below reminding members to update their COI forms. If any updates to their COI information have not been submitted, they are instructed not to participate in discussion where an undisclosed conflict may exist.

Finally, all ACR AC are published as part of the Journal of the American College of Radiology (JACR) electronic supplement. Those who participated on the document and are listed as authors must complete the JACR process that includes completing the International Committee of Medical Journal Editors (ICMJE) COI form which is reviewed by the journal's staff/publisher.

The authors have no conflicts of interest related to the material discussed in this article.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from the American College of Radiology (ACR) Web site.

Availability of Companion Documents

The following are available:

- ACR Appropriateness Criteria®. Overview. Reston (VA): American College of Radiology; 2017. Available from the American College of Radiology (ACR) Web site.
- ACR Appropriateness Criteria®. Literature search process. Reston (VA): American College of Radiology; 2015 Feb. 1 p. Available from the ACR Web site.
- ACR Appropriateness Criteria®. Evidence table development. Reston (VA): American College of Radiology; 2015 Nov. 5 p. Available from the ACR Web site.
- ACR Appropriateness Criteria®. Topic development process. Reston (VA): American College of Radiology; 2015 Nov. 2 p. Available from the ACR Web site.
- ACR Appropriateness Criteria®. Rating round information. Reston (VA): American College of Radiology; 2017 Sep. 5 p. Available from the ACR Web site.

ACR Appropriateness Criteria®. Radiation dose assessment introduction. Reston (VA): American College of Radiology; 2017. 4 p. Available from the ACR Web site.

ACR Appropriateness Criteria®. Manual on contrast media. Reston (VA): American College of Radiology; 2017. 125 p. Available from the ACR Web site.

ACR Appropriateness Criteria®. Procedure information. Reston (VA): American College of Radiology; 2017 Mar. 4 p. Available from the ACR Web site.

ACR Appropriateness Criteria® imaging of deep inferior epigastric arteries for surgical planning (breast reconstruction surgery). Evidence table. Reston (VA): American College of Radiology; 2017. 13 p. Available from the ACR Web site.

ACR Appropriateness Criteria® imaging of deep inferior epigastric arteries for surgical planning (breast reconstruction surgery). Literature search. Reston (VA): American College of Radiology; 2017. 2 p. Available from the ACR Web site.

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on March 15, 2018. The guideline developer agreed to not review the content.

This NEATS assessment was completed by ECRI Institute on February 14, 2018. The information was verified by the guideline developer on March 15, 2018.

Copyright Statement

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